BEFORE THE
FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C. 20554

In the Matter of	)	
	)	
Promoting Investment in the 3550-3700 MHz Band;	)	GN Docket No. 17-258
	)	
	)	
Petitions for Rulemaking Regarding the Citizens Broadband Radio Service	)	RM-11788 (Terminated) RM-11789 (Terminated)

COMMENTS OF COMCAST CORPORATION

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COMMENTS OF COMCAST CORPORATION

Comcast Corporation ("Comcast") hereby responds to the Notice of Proposed Rulemaking and Order Terminating Petitions ("*Notice*" or "*Order Terminating Petitions*") adopted by the Federal Communications Commission ("Commission") in the above-referenced docket.[1]

I. INTRODUCTION AND SUMMARY

The 3.5 GHz "innovation band" holds great potential to support a variety of traditional wireless services while encouraging deployment of new technologies and business models. Targeted enhancements considered in this proceeding will promote robust investment and network deployment, and build upon the regulatory framework that the Commission adopted for the 3.5 GHz Band in 2015. Such changes would increase even more the significant interest and investment activity that the current rules already have generated.

[1] *Promoting Investment in the 3550-3700 MHz Band; Petitions for Rulemaking Regarding the Citizens Broadband Radio Service*, Notice of Proposed Rulemaking and Order Terminating Petitions, GN Docket No. 17-258, 32 FCC Rcd 8071 (Oct. 24, 2017) ("*Notice*" or "*Order Terminating Petitions*," as applicable).

With this *Notice,* the Commission is revisiting key aspects of its original approach, including the license areas, terms, and renewability of Priority Access Licenses ("PALs") and technical rules essential to preventing harmful interference to PAL and General Authorized Access ("GAA") users. Modest rule changes would make the band even more attractive to a broad range of potential applications and "foster an investment environment for the band to flourish in the United States."[2] The Commission should address all of these components holistically and adopt a balanced approach that encourages innovation and robust investment in both the PAL and GAA tiers. Specifically, the Commission should:

- *License PALs on a county basis.* County-level licenses strike a balance between small, granular license areas that promote innovative uses of the band and the administrative efficiency and investment incentives that come with larger license areas.

- *Extend PAL terms to a seven-year duration, with a renewal expectancy if performance requirements are met.* This longer license term will allow sufficient time for buildout and provide more assurance of a return on investment, with accountability to promote efficient use of scarce spectrum resources.

- *Make all PALs available for auction (up to the current maximum of seven in each license area).* There is no supportable basis to artificially constrain supply given the Commission's enhanced focus on PAL investment, and auctioning all PALs would best meet statutory objectives under Section 309(j).

- *Reject proposals to permit bidding on specific spectrum blocks.* Block-specific bidding would not be practical or desirable in the 3.5 GHz Band and would have unintended consequences for incumbents and other users.

- *Maintain existing technical rules.* Proposals to relax emission rules or raise power limits could increase interference with adjacent-band operations and disrupt the balance among various users of the 3.5 GHz Band.

- *Allow limited, non-public disclosure of Citizens Broadband Service Device ("CBSD") registration information to Spectrum Access Systems ("SAS") Administrators.* This proprietary network information should be shared among SAS Administrators to facilitate frequency coordination and be made available in an aggregated form to help prospective

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[2] *Notice* ¶ 3.

users of the 3.5 GHz Band plan their deployments, but it should not be available to the general public due to concerns of disclosing competitively sensitive information.

- *Support external efforts to promote coexistence and fair sharing in the GAA portion of the band.* The Commission should support industry efforts to make GAA coexistence an SAS responsibility.

Global leadership in 5G requires that the Commission and its rules "keep up with technological advancements, create incentives for investment, encourage efficient spectrum use, support a variety of different use cases, and promote robust network deployments in both urban and rural communities."[3] With an eye towards those principles, the Commission here is fulfilling its spectrum policy role, "to ensure that investment and innovation is promoted, that flexible use is permitted, and that the spectrum is attractive to as many users as possible."[4]

The 3.5 GHz Band is indeed "about creating something different."[5] The rules the Commission adopted in 2015 were intended to make the 3.5 GHz Band "hospitable to a wide variety of users, deployment models, and business cases."[6] Comcast has a strong, shared interest with the Commission in developing a regulatory framework for the 3.5 GHz Band that promotes continued investment and balances the needs and interests of a diverse set of PAL licensees and GAA users. Like many other parties across multiple sectors of the economy, Comcast already is participating and investing meaningfully in the 3.5 GHz Band. Comcast has been a full member of the CBRS Alliance since October 2016 and has assembled a dedicated technical team to

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3 *Id.* ¶ 2.

4 *Notice* and *Order Terminating Petitions* at 8110 (Statement of Commissioner O'Rielly).

5 *Id.* at 8112 (Statement of Commissioner Carr).

6 *Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, Report and Order and Second Further Notice of Proposed Rulemaking, GN Docket No. 12-354, 30 FCC Rcd 3959 ¶ 6 (2015) ("*First Report and Order*" or "*Second FNPRM*," as applicable).

participate in the group and contribute to its work. Outside of the Alliance, Comcast's technical team is involved in multiple invitational and *ad hoc* operator, vendor, and other CBRS-related conferences, and Comcast recently hosted an operator-only CBRS Alliance meeting in Philadelphia in December 2017. Comcast also is actively involved with CableLabs as a participant in the Wireless Innovation Forum ("WInnForum"), and the Comcast team participates directly in the 3rd Generation Partnership Project ("3GPP") to develop standards for mobile broadband.

As the nation's largest provider of Wi-Fi hotspots, Comcast has invested heavily in technology akin to the small cell deployments that the Commission seeks to promote in this proceeding. The cable industry has longstanding experience delivering innovative wireless services and a demonstrated interest in multiple use cases for the 3.5 GHz Band. This investment was encouraged by a balanced regulatory environment that supports a broad range of business and technical models and a robust three-tier framework supporting the needs of incumbent, PAL, and GAA users.

II. THE COMMISSION SHOULD LICENSE PALS ON A COUNTY BASIS.

Consistent with its goal to "encourage robust investment in network deployment," the *Notice* seeks comment on "increasing the geographic licensing area of PALs to stimulate additional investment, promote innovation, and encourage efficient use of spectrum resources."[7] It also seeks comment on specific proposals to adopt Partial Economic Area ("PEA")-sized license areas, asking whether PEAs would "strike an appropriate balance between facilitating access to spectrum by both large and small providers while incentivizing investment in, and

[7] *Notice* ¶¶ 1, 23.

rapid deployment of, new technologies."[8] As the Commission notes, license area sizes raise several critical questions for the future development of the 3.5 GHz Band, including "whether a larger license area would provide additional flexibility to facilitate the deployment of a wide variety of technologies, including 5G," and whether PEA-sized license areas would "effectively balance the objectives set forth in section 309(j) of the Act, including . . . 'an equitable distribution of licenses and services among geographic areas' and 'economic opportunity for a wide variety of applications.'"[9]

Larger geographic license areas for PALs may lead to more efficient deployment of 3.5 GHz services, but areas should remain small enough to ensure economic viability for a variety of business and technical plans and encourage robust participation in auctions. County-sized licensing strikes the right balance, will attract PAL investment, and should ensure that the 3.5 GHz Band remains accessible for non-traditional participants and innovative business models.[10]

A. County-Based Licensing Strikes an Appropriate Balance Between the Relative Benefits of Large and Small License Areas.

Counties are inherently well-suited to licensing the 3.5 GHz Band. They are small enough to support a wide variety of business and technical models, but large enough to enable the plans of providers that envision wider area deployments, thus encouraging increased investment in PALs. County-sized license areas are also more appropriate than larger license

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8 *Id.* ¶ 24.

9 *Id.* ¶¶ 23-24.

10 Comments of NCTA – The Internet & Television Association, GN Docket No. 12-354, at 1-2 (July 24, 2017) ("NCTA Comments"); Comments of Charter Communications, Inc., GN Docket No. 12-354, at 3 (July 24, 2017) ("Charter Comments").

areas for the small cell deployments that are likely to be prevalent in the band, as small cell technology permits providers to target their deployments to localized areas. As Chairman Pai recently noted, "[t]he networks of the future will require not so much massive cell towers as hundreds of thousands of small cells."[11] Because counties are loosely correlated with population, they already reflect many of the considerations businesses analyze when planning those deployments.[12] In this regard, it is also helpful that robust measurement tools already exist at the county level to enable smaller entrants to quickly obtain the kind of information that would be helpful in planning deployments, such as population size, proximity, and adjacency to metropolitan areas and centers of population.[13]

Moreover, the fact that counties vary in size, population, and demographics can be "advantageous" for licensing purposes, because these types of variations enable opportunities both for providers who seek to serve smaller areas and those who wish to serve larger areas.[14] Thus, county-based licensing would directly advance the Commission's goals for the 3.5 GHz

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[11] Remarks of Ajit Pai, Chairman, FCC, Symposium on "The Future of Speech Online," Washington, DC (Sept. 15, 2017) *available at* https://apps.fcc.gov/edocs_public/attachmatch/DOC-346747A1.pdf.

[12] *See* Letter from Colleen King, Vice President, Regulatory Affairs, Charter Communications, to Marlene H. Dortch, Secretary, FCC, GN Docket Nos. 17-258 and 12-354, at 2 (Oct. 18, 2017) (explaining that county-based licensing would enable Charter to tailor its investment by targeting deployments that will leverage its existing hybrid fiber-coaxial plant, which efficiently provides backhaul, power, and location).

[13] *See, e.g.*, United States Department of Agriculture, Economic Research Service, Rural Urban Continuum Codes, https://www.ers.usda.gov/data-products/rural-urban-continuum-codes (updated Oct. 12, 2016); United States Department of Agriculture, Economic Research Service, Urban Influence Codes, https://www.ers.usda.gov/data-products/urban-influence-codes (updated Oct. 12, 2016).

[14] *Use of Spectrum Bands Above 24 GHz for Mobile Radio Services*, Notice of Proposed Rulemaking, 30 FCC Rcd 11878 ¶ 112 (2015) ("*Spectrum Frontiers NPRM*").

Band by opening up opportunities for a wide variety of applicants and ensuring the intensive and efficient use of spectrum.[15]

At the same time, county-based licensing would not foreclose wide-area and even nationwide deployments. Counties have long been the basic building blocks for wireless services across many different bands.[16] Wide-area providers can combine multiple county-sized licenses to form coverage areas that align with CMA-based, PEA-based, EA-based, or even larger deployments.[17] In addition, county-based licensing would alleviate the concern that too-small license areas would limit investment in PALs,[18] or unnecessarily complicate the auctioning and management of tens of thousands of license areas.[19]

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15 *Notice* ¶ 23.

16 *See Amendment to the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, Further Notice of Proposed Rulemaking, 29 FCC Rcd 4273 ¶ 45 (2014) (noting counties, Economic Areas ("EAs"), and Cellular Market Areas ("CMAs") as the Commission's "traditional license areas"); Final Redefinition of BEA Economic Areas, 60 Fed. Reg. 13,114 (Mar. 10, 1995) (defining an EA as "one or more economic nodes – metropolitan areas or similar areas that serve as centers of economic activity – and the surrounding counties that are economically related to the nodes").

17 *See Notice* ¶ 24 (noting that "counties nest into PEAs, which in turn nest into EAs," and that "[t]his nesting would make it easier for operators to combine or partition their PEAs into the license areas of their choice").

18 *See id*. ¶ 23.

19 *See id*. ¶ 26; *see also Petition of CTIA for Rulemaking to Amend the Commission's Rule Regarding the Citizens Broadband Radio Service in the 3550-3700 MHz Band,* RM-11788, at 9-10 (filed June 16, 2017) ("*CTIA Petition*") (arguing that the large number of border areas created by census tract-based licensing will unnecessarily multiply interference risks); Petition of T-Mobile USA, Inc. for Rulemaking To Maximize Deployment of 5G Technologies in the Citizens Broadband Radio Service, RM-11798, at 16-18 (filed June 19, 2017) ("*T-Mobile Petition")* (same).

B. The Commission Has Recently Acknowledged the Efficiency of County-Based Licensing for Small Cell Bands.

In the 2016 *Spectrum Frontiers Report and Order*, the Commission adopted county-based licensing for Upper Microwave Flexible Use Service ("UMFUS") licenses and county-based subdivisions for existing Local Multipoint Distribution Service ("LMDS") licenses in the 28 GHz Band.[20] In doing so, the Commission noted that a "county-based license affords a licensee the flexibility to develop localized services, allows for targeted deployments based on market forces and customer demand, and facilitates access by both smaller and larger carriers."[21] The Commission considered "claims of certain commenters that larger license areas will better fit the services contemplated for these bands," but found that such claims "do not take into account the potential need for targeted deployment."[22] In reaching this determination, the Commission noted "significant domestic and international interest in making the 28 GHz band available for new mobile uses," including 5G, and found that its flexible use approach to licensing in that band would advance those goals.[23] These same considerations support licensing on a county basis in the 3.5 GHz Band.

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20 *Use of Spectrum Bands Above 24 GHz For Mobile Radio Service*, Report and Order and Further Notice of Proposed Rulemaking, 31 FCC Rcd 8014 ¶ 35 (2016) ("*Spectrum Frontiers Report and Order*").

21 *Id.*

22 *Id.*

23 *Id.* ¶ 27.

Four considerations led the Commission to adopt county-based licensing in the *Spectrum Frontiers* proceeding,[24] and all four similarly support licensing PALs on a county basis in the 3.5 GHz Band.

- First, the Commission found that county-based licensing would "best fit" the "localized services" contemplated for millimeter-wave spectrum, given that such bands "do not propagate well over long distances" and would therefore likely be host to small cell deployments.[25] The 3.5 GHz Band, which is also characterized by limited propagation distances *vis-à-vis* other mobile bands, is also being widely targeted for localized small cell services, making county-based licensing appropriate there as well.[26]

- Second, the Commission found "smaller licenses" appropriate to permit licensees to target their deployments to areas where additional capacity is demanded, "allow[ing] licensees to base their deployment decisions on market forces and customer demand."[27] Similar considerations hold true for the 3.5 GHz Band,

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[24] The Commission initially proposed county-sized licenses for all of the bands in the *Spectrum Frontiers* proceeding. *See Spectrum Frontiers NPRM* ¶ 110. It ultimately saw fit to deviate from that plan for the 37 and 39 GHz bands, but its reasoning for doing so would not apply to the 3.5 GHz Band. Some parties had opposed county-based licensing in the 39 GHz Band because they thought that "counties will result in more license areas, which will make it more difficult for licensees to coordinate border areas with each other." *Spectrum Frontiers Report and Order* ¶ 81. Here, in contrast, the 3.5 GHz Band will leverage SAS databases to dynamically coordinate any potential interference in border zones, substantially mitigating interference concerns.

[25] *Spectrum Frontiers NPRM* ¶ 111; *see also* Comments of the Consumer Electronics Association, GN Docket No. 14-177 et al., at 13 (Jan. 15, 2015) (noting that millimeter-wave bands "require a much greater density of base stations" and that "[r]eliance on the marketplace and physics, rather than ungrounded regulatory requirements, will lead to the best uses of the available spectrum"); Comments of NYU Wireless, GN Docket No. 14-177 et al., at 53 (Jan. 15, 2015) (noting that "[l]arger areas" are "not meaningful for mmWave technology, given its short range and inability to serve areas . . . in the foreseeable future"); *see also Spectrum Frontiers NPRM* ¶ 6 (noting that small cell technology will be a key use of millimeter-wave bands).

[26] *See First Report and Order* ¶ 1 (noting that small cell technology will be a key use of the 3.5 GHz Band); *see also* Comments of Southern Linc, GN Docket No. 12-354, at 7 (July 24, 2017) ("Southern Linc Comments"); Reply Comments of Google, Inc., GN Docket No. 12-354, at 11 (Aug. 8, 2017) ("Google Reply Comments").

[27] *Spectrum Frontiers NPRM* ¶ 111. Some commenters in the *Spectrum Frontiers* proceeding had favored larger basic trading area ("BTA") licenses for the 28 GHz Band, but the Commission determined that "the benefits of smaller license areas for this specific band

where small cell deployments are likely to be targeted to focus on areas where services are demanded.[28]

- Third, the Commission noted that smaller license areas would "reduce the potential for warehousing spectrum,"[29] and, similarly, larger areas increase the likelihood that some spectrum outside of core business priorities will be under-utilized.[30]

- Fourth, the Commission determined that smaller, county-based licenses would allow carriers of different sizes to "tailor their spectrum acquisitions to the locations for which they need it the most,"[31] a consideration equally relevant to the 3.5 GHz Band.[32]

More generally, the Commission determined in the *Spectrum Frontiers Report and Order* that county-based licensing would strike an appropriate balance, supporting innovation by permitting more targeted deployments while also enabling providers to easily aggregate multiple licenses to serve wider areas. In adopting this approach, the Commission noted that it was "endeavoring to create a regulatory scheme that will suit the development of innovative wireless

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outweigh any administrative burden on licensees and the Commission." *Spectrum Frontiers Report and Order* ¶ 35.

28 *See supra* note 10 and accompanying text.

29 *Spectrum Frontiers NPRM* ¶ 11; *see also* Comments of ViaSat, Inc., GN Docket No. 14-177 et al., at 12 (Jan. 15, 2015) (urging the Commission not to adopt exclusive rights over "large geographic service areas, because doing so could leave areas where spectrum would go unused for terrestrial purposes for significant purposes.").

30 Although the possibility of opportunistic GAA use of any unused PAL spectrum resolves concerns regarding the warehousing of spectrum itself, the potential for foreclosure of others from obtaining priority access rights remains. As discussed further below, such foreclosure would undermine the Commission's goals for the 3.5 GHz Band. *See Infra* Part III-B.

31 *Spectrum Frontiers NPRM* ¶ 111.

32 *See Notice* ¶ 24; *First Report and Order* ¶ 6.

services for years to come."[33] County-based licensing would strike an appropriate balance for the 3.5 GHz "innovation band" for the same reasons.[34]

C. PEA-Based Licensing Would Discourage Broader Participation in the Band.

The Commission has asserted that, "[t]o maintain U.S. leadership in the global race for 5G, we must ensure that the service rules governing bands that are critical for 5G network deployments—including the 3.5 GHz Band—keep up with technological advancements, create incentives for investment, encourage efficient spectrum use, support a variety of different use cases, and promote robust network deployments in both urban and rural communities."[35] But licensing PALs on a PEA basis could negatively affect investment in PALs and the diversity of PAL services and users.[36] License sizes that are too large could increase barriers to entry, promote market inefficiencies, and skew the 3.5 GHz Band framework too far in the direction of wide-area network business and technical models, contrary to the Commission's goals.[37]

Comcast was a successful bidder on PEA-based licenses in the recent 600 MHz Incentive Auction, and it understands firsthand the arguments supporting the economies of scale that such

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33 *Spectrum Frontiers Report and Order* ¶ 36 ("Counties . . . are the base unit that make up common commercial wireless license sizes, including EAs and the new Partial Economic Area (PEA) license areas."); *see also supra* notes 16-17 and accompanying text.

34 *First Report and Order* ¶ 2.

35 *Notice* ¶ 2.

36 *See id.* ¶ 24 ("We seek comment on Petitioners' specific request to increase the license size of PALs to PEAs, and how this would affect investment in PALs—both investments currently underway and future PAL investment—and diversity of PAL uses and users.").

37 *See id.* ("Would PEAs strike an appropriate balance between facilitating access to spectrum by both large and small providers while incentivizing investment in, and rapid deployment of, new technologies?").

large areas can provide to licensees. But the use of PEA-based licenses also created situations where licenses included geographic areas that were outside current business priorities, but may have been valuable to other auction participants. This experience suggests that a PEA-based approach would not enable opportunities for a wide variety of applicants. PEAs are generally too large to serve as the basis for the kinds of targeted deployments that county-based licensing would enable,[38] and they are not aligned with the innovative, low power, small cell use cases in this band that the Commission and many participants in the 3.5 GHz ecosystem have envisioned. Entities seeking to deploy services requiring interference protection on a localized basis would be forced to acquire wide swaths of PAL spectrum that they do not need and may not use. If an applicant were interested in acquiring spectrum only in a targeted footprint, the extraneous coverage in a PEA would impose excess costs and restrict the amount of money that could be used for acquiring additional spectrum or additional network buildout. Such economic inefficiencies significantly and unnecessarily increase costs for entities and discourage investment by other stakeholders.[39]

D. Secondary Market Opportunities Should Be Available, but They Are Not a Cure-All for the Deficiencies of Larger License Areas.

The *Notice* suggests that "if the Commission were to make changes to the PAL license term, renewability, and geographic area, then the ability of a PAL licensee to partition or disaggregate its license on the secondary market could be a useful tool to ensure robust and

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38 *See supra* notes 10, 22, 23 and accompanying text.

39 In the Incentive Auction, Comcast's costs to obtain coverage for the areas it sought to serve would have been reduced by 20 to 30 percent had county-based licensing been adopted, while other bidders may have been willing to pay more for licenses covering those areas.

targeted use of the spectrum throughout the license area."[40] Although they promote market-based incentives, partitioning, disaggregation, and other secondary market activities should not be relied upon as a panacea for an initial incorrect auction design. The ability to partition or disaggregate PAL rights would not effectively mitigate the potential harms of licensing PALs at the PEA level, or make adequate 3.5 GHz spectrum available for rural or small-scale deployments. To be clear, twenty-plus years of auction history has shown that it is much more efficient to aggregate up desired territories in an auction than to sell unneeded portions of a license outside of an auction.

The record in this and other Commission proceedings reveals significant friction and inefficiency in secondary markets, with high transaction costs that often limit the potential for partitioning and disaggregation to result in an ideal allocation of spectrum rights.[41] The *Notice* acknowledges commenters' concerns that "PAL licensees will lack an incentive to disaggregate or partition a larger, longer-term PAL" and asks whether reasonable performance requirements would "encourage a robust secondary market for PALs to facilitate targeted and intensive

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40 *Notice* ¶ 30.

41 *See, e.g.,* Comments of Google, Inc., GN Docket No. 12-354, at 26 (July 24, 2017) ("Google Comments") ("[T]he mere legal right for a PAL holder to partition or disaggregate its spectrum would provide no practical assurance of spectrum availability."); Southern Linc Comments at 8 ("The secondary market . . . cannot be relied upon as an option for those operating in smaller geographic areas to obtain the benefits and protections afforded by PALs."); Reply Comments of the Utilities Technology Council ("UTC"), GN Docket No. 12-354, at 4 (Aug. 8, 2017) ("UTC Reply Comments") ("[I]t appears unlikely that secondary markets for access to [3.5 GHz] spectrum would result from these proposals, because the major wireless carriers would have little incentive to disaggregate or partition their licenses and lease capacity to utilities or other third parties."); Letter from Phillip Berenbroick, Senior Policy Counsel, Public Knowledge, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-354 at 3 (Oct. 17, 2017) ("Relying on large wireless providers to partition PEA-sized PALs so that smaller users can be accommodated . . . creates significant transaction costs for entities that would otherwise likely applied for census tract-sized PALs.").

spectrum use."[42] Although the Commission should adopt reasonable performance requirements as discussed below,[43] it is not at all clear that such requirements would encourage the secondary market the Commission hopes for. Recent experience demonstrates that larger spectrum licenses are partitioned or disaggregated infrequently, and that it is more common for license holders to aggregate smaller license areas than to disaggregate larger ones.

For instance, as part of the debate over geographic license areas in the Incentive Auction, rural broadband providers commissioned an analysis by NERA Economic Consulting "to explore the arguments for and against using smaller geographic area licenses" for the Forward Auction in the 600 MHz band.[44] The *NERA Report* observed that "while it is possible that inefficiencies in primary allocation may be corrected in the secondary market, there is no guarantee this will happen," and that, "[i]n particular, trades between large and small operators may be frustrated by high transaction costs or by inertia."[45] More specifically, the *NERA Report* found that "larger operators may give very low priority to disaggregating small area licenses, given their small value as a proportion of overall holdings," and that "there is little recent history of the larger carriers leasing, disaggregating or partitioning large sections of spectrum where they already

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42 *Notice* ¶ 32 (citing Google Reply Comments at 14-15; Southern Linc Comments at 7-8; UTC Reply Comments at 4; and Comments of the Wireless Internet Service Providers Association ("WISPA"), GN Docket No. 12-354, at 25 (July 24, 2017) ("WISPA Comments")).

43 *See infra* Part III-B.

44 Richard Marsden, Chantale LaCasse, and Jonathan Pike, *Local and Regional Licensing for the U.S. 600 MHz Band (Incentive Auction)* (Jan. 2014) ("*NERA Report*"), *available at* http://www.nera.com/content/dam/nera/publications/archive2/PUB_NCTA_0114.pdf.

45 *Id.* at 18.

have service."[46] Underscoring that point, NERA found at least a dozen examples of secondary market transactions from 2008 to 2013 – all of which involved larger carriers acquiring spectrum rights from smaller entities.[47]

E. The Commission Should Maintain the 40-Megahertz Spectrum Aggregation Limit.

Finally, neither changes to PAL geographic areas nor any of the other potential changes proposed in the *Notice* would warrant changes to the 40-megahertz spectrum aggregation limit adopted in the *First Report and Order*.[48] The Commission correctly determined that a 40-megahertz limit will promote competition and innovation by ensuring at least two parties have access to PALs.[49] This reasoning holds true regardless of the geographic area encompassed by each PAL, and none of the other changes the Commission has proposed would warrant a different result. Under the current limit, a single entity could still utilize GAA spectrum to supplement up to four 10-megahertz PALs, creating a substantial 3.5 GHz footprint of 120 megahertz.[50] Moreover, an aggregation limit assures a "minimum degree of diversity" among

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46 *Id.*

47 *Id.* Although NERA concluded that PEA-sized license areas would be "right-sized" for the 600 MHz band in the Incentive Auction context, that was in contrast to proposals for much larger *EA-sized* licenses, and with respect to a spectrum band with very different propagation characteristics and use cases as compared to the 3.5 GHz Band. There, as here, the point was that secondary markets cannot be relied upon to cure fundamental flaws of adopting license areas that are poorly suited to the characteristics and intended uses of a band. As the *NERA Report* concluded, "[a] right-sized . . . approach . . . would appear to strike the right balance and provide the best potential solution." *Id.* at 52.

48 47 C.F.R. § 96.31; *see Notice* ¶ 27; *First Report and Order* ¶¶ 117-121.

49 *First Report and Order* ¶ 121.

50 *Id.*

3.5 GHz users, consistent with Section 309(j), and will promote innovations that "may lead to positive spillovers in the development of other spectrum bands in the future."[51]

III. PAL TERMS SHOULD BE SEVEN YEARS AND RENEWABLE IF PERFORMANCE REQUIREMENTS ARE MET.

The *Notice* wisely proposes to increase the PAL license term beyond the three years provided for in the current rules and to allow licensees to renew when the term ends.[52] The Commission has specifically proposed to adopt ten-year, renewable terms;[53] while some other groups prefer three-year, nonrenewable terms. As other commenters have noted, a middle ground is appropriate;[54] specifically, license terms of a seven-year duration, together with a renewal expectancy, strike the right balance.

A. Seven-Year Terms Strike the Appropriate Balance Between Protecting Investments and Ensuring Efficient PAL Assignments.

License terms longer than three years would significantly strengthen the business case for an upfront investment in PALs and in the 3.5 GHz Band in general, helping to prevent stranded investment and protecting CAPEX. The Commission has recognized in this proceeding and others that license terms must last long enough for an entity "to design and acquire the necessary equipment and devices and to deploy facilities across the license area."[55] At the same time,

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51 *Id*. ¶ 120.

52 *Notice* ¶ 13; 47 C.F.R. § 96.25(b)(3).

53 *Notice* ¶ 13; *T-Mobile Petition* at 11-13; *CTIA Petition* at 6-9.

54 *See* NCTA Comments at 10-12; Charter Comments at 3.

55 *Notice* ¶ 13; *see also* Comments of AT&T, GN Docket No. 12-354, at 4-5 (July 24, 2017) ("AT&T Comments") (stating that a term longer than three years is necessary to ensure that providers can meet customer expectations for performance and reliability).

license terms that are too long could lead to warehousing and could raise significant barriers to entry, thereby limiting the potential for new uses of the band and discouraging the small cell vendor ecosystem.[56] Given these constraints, initial and subsequent terms of seven years would strike the right balance and achieve the Commission's objectives for the band.

Generally speaking, the useful life of most of the relevant network equipment that would be deployed is probably about seven years,[57] so a term of similar duration would enhance incentives to invest by allowing companies to amortize costs. And, as the Commission has acknowledged, deployment challenges are heightened where the new technology is "nascent and will require time to fully develop," because standards must be completed and equipment developed prior to deployment.[58] Under the current rules, while bidders in the initial auction would have the opportunity to bid on two three-year terms, that term would be limited only to the

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56 *See Notice* ¶ 12.

57 *See, e.g.*, Rev. Proc. 2011-22, 2011-18 I.R.B. 737 (establishing a seven-year general depreciation schedule for antenna systems and equipment at mobile telephone switching offices and cell sites for which an alternate schedule is not expressly provided); Internal Revenue Service, *Internal Revenue Manual* 1.35.6.10.1 (May 5, 2014), *available at* https://www.irs.gov/irm/part1/irm_01-035-006 (stating that, in capitalizing information technology equipment, the Internal Revenue Service assumes that telecommunications equipment has a useful life of seven years); *see also* 3GPP, Releases, http://www.3gpp.org/specifications/67-releases (last visited Dec. 19, 2017) (revealing that this approach also is consistent with the six-to-seven-year average time between major 3GPP releases of the most recent generations of cellular technology, *e.g.*, Release 4 (3G) in 1998, Release 8 (4G) in 2006, Release 12 (LTE Evolution/Advanced) in 2011, and Release 15-16 (5G fixed) in 2016-2017).

58 *Spectrum Frontiers Report and Order* ¶ 176; *see also id*. (finding that a ten-year term would be sufficient to plan and deploy service, provided that standards are complete by 2020); Comments of Verizon, GN Docket No. 12-354, at 4-6 (July 24, 2017) ("Verizon Comments") (stating that three years is too short to allow for standards development, certification, equipment production, and deployment); Reply Comments of CTIA, GN Docket No. 12-354, at 5-6 (Aug. 8, 2017) (same).

first auction.[59] After that initial auction, existing PAL licensees would be limited to subsequent three-year terms that are not long enough to support investment in new equipment, likely depressing interest in even the initial auction. Potential PAL licensees that either choose not to participate in the initial auction or do not successfully win any licenses in that auction would not have the opportunity to take advantage of even a *de facto* six-year initial term. To promote ongoing investment in PALs, the license term must be long enough in *all* PAL auctions.

A three-year license term also ignores the substantial barriers that continue to impede deployment of broadband infrastructure. The Commission has convened a Broadband Deployment Advisory Committee to address excessive fees, siting moratoria, unduly lengthy application reviews, and other such barriers, and it has been working to ameliorate these challenges through multiple proceedings whose dockets are overflowing with examples of both wireless and wireline providers facing obstacles to their efforts to deploy.[60] Congress has been

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59 *See* 47 C.F.R. § 96.27(b).

60 *See generally Streamlining Deployment of Small Cell Infrastructure by Improving Wireless Facilities Siting Policies; Mobilitie, LLC Petition for Declaratory Ruling*, Public Notice, 31 FCC Rcd 13360 (2016); *Accelerating Wireless Broadband Deployment by Removing Barriers to Infrastructure Investment*, Notice of Proposed Rulemaking and Notice of Inquiry, 32 FCC Rcd 3330 (2017); *Accelerating Wireline Broadband Deployment by Removing Barriers to Infrastructure Investment*, Notice of Proposed Rulemaking and Notice of Inquiry, 32 FCC Rcd 3266 (2017); *New Docket Established For Broadband Deployment Advisory Committee; Accelerating Broadband Deployment*, Public Notice, 32 FCC Rcd 2930 (2017).

holding hearings on the topic,[61] and attempting to provide a legislative solution.[62] The deployment challenges at the center of all of these efforts should reinforce the fact that broadband providers need ample time to build out their networks.

Comcast and others would be substantially more likely to invest in PALs if licensees were afforded a more reasonable period of time to overcome systemic barriers to deployment and to recover their initial and subsequent investments in this nascent band.[63] A seven-year license term would therefore advance the Commission's goal of "facilitat[ing] the deployment of a wide array of technologies,"[64] and follow Commissioner O'Rielly's admonition that the Commission

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61 *See, e.g.*, U.S. Senate Committee on Commerce, Science, & Transportation, *Advancing the Internet of Things in Rural America*, https://www.commerce.senate.gov/public/index.cfm/hearings?ID=CD70F6B9-E4DA-4AC2-AA3C-11B69EB6D0A3 (Nov. 7, 2017); U.S. Senate Committee on Commerce, Science, & Transportation, *Investing in America's Broadband Infrastructure: Exploring Ways to Reduce Barriers to Deployment*, https://www.commerce.senate.gov/public/index.cfm/hearings?ID=98C6FDC4-B916-41FA-A78A-80E6D513E652 (May 3, 2017); U.S. House of Representatives Committee on Energy and Commerce, Subcommittee on Communications and Technology, *Fueling the 21st Century Wireless Economy*, https://energycommerce.house.gov/hearings/facilitating-21st-century-wireless-economy; U.S. House of Representatives Committee on Energy and Commerce, Subcommittee on Communications and Technology, *Broadband: Deploying America's 21st Century Infrastructure*, https://energycommerce.house.gov/hearings/broadband-deploying-americas-21st-century-infrastructure (Mar. 21, 2017).

62 *See, e.g.*, SPEED Act, S. 1988, 115th Cong. (2017); MOBILE NOW Act, S. 19, 115th Cong. (2017); *see also* Kristal High, *Thune, Schatz Eyeing Broadband Benefits With New Infrastructure Draft*, Politic365, http://politic365.com/2017/11/13/thune-schatz-eyeing-broadband-benefits-with-new-infrastructure-draft (Nov. 13, 2017).

63 NCTA Comments at 10-11; Comments of United States Cellular Corp., GN Docket No. 12-354, at 6-7 (July 24, 2017) ("USCC Comments"); Comments of Boingo Wireless, GN Docket No. 12-354, at 1-2 (July 24, 2017) ("Boingo Wireless Comments").

64 *Notice* ¶ 14.

should not "adopt artificial restrictions through license and auction structure to dissuade some uses or users while promoting others."[65]

B. PALs Will Attract More Investment if They Are Renewable, but Renewal Should Be Tied to Performance Requirements.

Eliminating the requirement that PALs automatically terminate at the end of the license term promotes the correct incentives for investment, so long as the Commission also adopts meaningful performance requirements and renewal standards as contemplated in the *Notice*.[66] An option to renew would significantly improve the business case for initial investment in PALs by removing the uncertainty created by the need to participate in regular auctions to retain priority access.[67] As AT&T has suggested, PAL licensees' long-term investment plans should be "encouraged and rewarded" to "permit the greatest possible innovation for the benefit of 3.5 GHz spectrum users."[68] But any expectation for renewal must be accompanied by meaningful performance requirements that will motivate licensees to either use their spectrum, return it to the Commission, or make it available to others through secondary market transactions.[69]

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65 *Notice* and *Order Terminating Petitions* at 8110-11 (Statement of Commissioner O'Rielly).

66 *Notice* ¶¶ 13, 17, 18; *see* 47 C.F.R. § 96.25(b)(3).

67 *See T-Mobile Petition* at 11-12; *CTIA Petition* at 8; Boingo Wireless Comments at 1; Comments of 5G Americas, GN Docket No. 12-354, at 11 (July 24, 2017) ("5G Americas Comments"); Verizon Comments at 6-7; Comments of Ericsson, GN Docket No. 12-354, at 6 (July 24, 2017); Comments of Qualcomm Inc., GN Docket No. 12-354, at 7 (July 24, 2017).

68 AT&T Comments at 6.

69 Although traditional construction requirements could be workable, the Commission is currently considering a wide range of alternatives, some of which may be more appropriate for the 3.5 GHz "innovation band." *See*, *e.g.*, *Amendment of Parts 1, 22, 24, 27, 74, 80, 90, 95, and 101 To Establish Uniform License Renewal, Discontinuance of Operation, and Geographic Partitioning and Spectrum Disaggregation Rules and Policies for Certain Wireless Radio Services*, Second Report and Order and Further Notice of Proposed Rulemaking, 32 FCC Rcd

The Commission's reasoning for declining to adopt performance requirements in 2015 would no longer apply if it adopts longer license terms and a renewal expectancy in this proceeding. The Commission based that initial determination on the notion that PALs will have short, three-year, nonrenewable terms, such that "winning bidders . . . will have sufficient incentive to deliver service so as to avoid the need for prescribing any further performance requirements."[70] If the Commission adopts longer, renewable terms to promote investment and provide the other benefits of longer terms described above, its prior reasoning suggests that performance requirements will be necessary.

At the same time, the Commission cannot rely on opportunistic GAA use to "alleviate concerns involving spectrum warehousing."[71] In the 3.5 GHz Band two distinct issues relate to these concerns: warehousing of *spectrum itself* and warehousing of *interference protection rights*. Even if warehousing *spectrum* is not possible under the three-tier 3.5 GHz framework due to opportunistic GAA use, warehousing of *interference protection rights* remains possible absent performance requirements obliging operators to build. The Commission has previously specified its concern with ensuring the "periodic, market-based assignment of these *rights* in

8874 ¶¶ 98-111 (2017) (taking a "fresh look" at performance requirements for wireless services and seeking comment on a "range of possible actions" to revise these requirements); Comments of Paul Milgrom, GN Docket No. 12-354, at 6 (July 24, 2017) (proposing a "'foothold' auction system" offering "bidding credits for incumbents," which would address stranded investment concerns by "approximat[ing] [a] depreciating license solution through a modification to the auction system").

70 *First Report and Order* ¶ 113.

71 *Notice* ¶ 17; *see also* Joint Comments of Rural Wireless Association, Inc. and NTCA – The Rural Broadband Association, GN Docket No. 12-354, at 9 (July 24, 2017).

response to changes in local conditions and operator needs."[72] If priority access is essential for certain types of operations, then priority access rights must be allocated and used as efficiently as possible. Thus, even if warehousing of spectrum itself is not a concern for the 3.5 GHz Band, foreclosing others from obtaining priority access rights is. This practice would trigger the same concerns that underlie Section 309(j)'s mandate that, when auctioning spectrum licenses, "the Commission shall . . . include performance requirements, such as appropriate deadlines and penalties for performance failures, to ensure prompt delivery of service to rural areas, to prevent stockpiling or warehousing of spectrum by licensees or permittees, and to promote investment in and rapid deployment of new technologies and services."[73]

IV. ALL PALS, UP TO THE CURRENT MAXIMUM OF SEVEN, SHOULD BE AVAILABLE FOR AUCTION.

The Commission should adopt its proposal to eliminate the rule limiting the number of PALs in any given license area to the number of applicants minus one, and permit the issuance of a PAL even where there is only one applicant in a given area, consistent with the view of other commenters.[74] These current licensing limitations are contrary to the public interest and only serve to artificially constrain the supply of PALs. Notably, *no commenter has expressed any opposition to this proposed change*.[75]

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72 *Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, GN Docket No. 12-354, Order on Reconsideration and Second Report and Order, 31 FCC Rcd 5011 ¶ 44 (2016) ("*Order on Reconsideration*") (emphasis added).

73 47 U.S.C. § 309(j)(4)(B).

74 *Notice* ¶ 42; 47 C.F.R. § 96.29(c)-(d); *see, e.g.*, Letter from Stephen E. Coran, WISPA, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 17-258 et al., at 2 (Oct. 19, 2017); *T-Mobile Petition* at 13-14.

75 *Notice* ¶ 40.

In its 2015 *First Report and Order,* the Commission decided to limit the number of PALs to one less than the number of PAL applicants to solve a perceived problem: It sought to use competitive bidding to issue PALs, because it determined that an auction was the most efficient means of allocating spectrum for exclusive use, and because foregoing PALs in favor of GAA-only use would "better encourage the larger and more effective use of radio in the public interest" than would assigning PALs by some method other than competitive bidding.[76] But the Commission determined that it had authority to use competitive bidding only where there are mutually exclusive applications.[77] So the Commission *created* mutual exclusivity, even where fewer than the maximum number of PALs receive bids, by "reducing the available PAL inventory" by one.[78]

Commenters have noted that, absent PAL renewability, this "*n* – 1" approach could lead to the undesirable outcome that PALs would be phased out in certain areas.[79] But if promoting investment in PALs is a goal, making available as many PALs as is technically feasible – while still allowing for robust GAA activity – is the most logical path forward.[80] Artificially limiting

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76 *First Report and Order* ¶¶ 134, 136; *Notice* ¶ 42; *see* 47 U.S.C. § 303(g).

77 *First Report and Order* ¶ 135; *Notice* ¶ 42; *see* 47 U.S.C. § 309(j)(1).

78 *First Report and Order* ¶ 134.

79 In any given auction, if current PAL holders in a geographic area simply bid on the PALs they currently hold, one PAL then in use will be eliminated by operation of Section 96.29(c), and this process could recur at successive auctions until no PALs remain. *Notice* ¶ 40; AT&T Comments at 10-11; *T-Mobile Petition* at 13-14; Petition for Reconsideration of CTIA – The Wireless Association, GN Docket No. 12-354, at 4 (July 23, 2015).

80 AT&T Comments at 10-11; Comments of Motorola Solutions Inc., GN Docket No. 12-354, at 4 n.2 (July 24, 2017) ("Motorola Comments"); USCC Comments at 8; 5G Americas Comments at 12.

the supply of PALs is directly contrary to that objective. As one former Commission Chief Technologist has noted, that approach not only "makes no sense," but it can also result in missed opportunities to close the digital divide.[81] And, as the *Notice* implies, maximizing the number of PALs by eliminating the "*n* – 1" rule would be consistent with the goals of Section 309(j).[82]

Nor is it necessary to maintain the "*n* – 1" rule to satisfy Section 309(j)(1). Courts have affirmed that the Commission may rely on a broad definition of "mutual exclusivity" when implementing new licensing schemes via auction.[83] Most recently, in the context of the Incentive Auction, the Commission rejected the argument that it cannot conduct an auction where a single applicant seeks a certain type of license.[84] Even if the Commission cannot use

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81 *See* Petition for Reconsideration of Jon M. Peha, GN Docket No. 12-354, at 2 (July 22, 2015) ("It is like saying that because we prefer competition among providers of broadband service, the FCC should make sure no one can bring broadband to an unserved geographic area unless a competitor is willing to do the same.").

82 *Notice* ¶ 42 (noting that Section 309(j)'s goals include promoting economic opportunity and competition, ensuring that new and innovative technologies are readily accessible, avoiding excessive concentration of licenses, disseminating licenses among a wide variety of applicants, recovering for the public a portion of the value of the public spectrum, and promoting the efficient and intensive use of spectrum); *see* 47 U.S.C. §309(j)(3)-(4).

83 *See Benkelman Tel. Co. v. FCC*, 220 F.3d 601, 605-06 (D.C. Cir. 2000) (upholding the Commission's finding of mutual exclusivity where applicants merely reserved the option to bid on all available licenses, and finding that that approach was "necessary to effectively implement the new [license auction] scheme").

84 *Expanding the Economic and Innovation Opportunities of Spectrum through Incentive Auctions*, Report and Order, 29 FCC Rcd 6567 ¶ 470 (2014) (concluding that Section 309(j)(1) permits the FCC to use competitive bidding where it accepts a single application to bid on initial 600 MHz flexible-use licenses and where it receives a single bid for specific reallocated spectrum).

competitive bidding to issue PALs absent mutual exclusivity,[85] it can still use competitive bidding to issue a single PAL to a sole bidder (and, more generally, to issue the same number of PALs as there are PAL applicants), because PAL issuance is *always* mutually exclusive of GAA use of the same spectrum.[86] This understanding is entirely consistent with the Commission's definition of "mutual exclusivity," under which two uses of spectrum are mutually exclusive wherever competing uses create a "conflict," such that granting one application would preclude the other "by reason of harmful electrical interference."[87]

V. IT IS NEITHER FEASIBLE NOR DESIRABLE TO PERMIT BIDDING ON SPECIFIC SPECTRUM BLOCKS.

The *Notice* asks whether it is feasible and desirable to allow PAL applicants to bid on specific channel assignments,[88] "rather than bidding solely on an amount of spectrum that will later be assigned by the SAS."[89] The answer to both questions is no. This approach would fundamentally alter the current framework under which licensees may request a particular channel or frequency range from the SAS but are not guaranteed a particular assignment, and would lead to unintended consequences that could actually harm PAL holders.

The Commission's current approach recognizes that 3.5 GHz is not a traditional band where block-specific bidding makes sense. Even if particular channels could be assigned to

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85 *See* 47 U.S.C. § 309(j)(1); *First Report and Order* ¶ 135; *Implementation of Section 309(j) of the Communications Act – Competitive Bidding*, Second Report and Order, 9 FCC Rcd 2348 ¶ 12 (1994) ("*1994 Competitive Bidding Order*").

86 *See Notice* ¶¶ 42, 45.

87 *1994 Competitive Bidding Order* ¶ 12 n.5.

88 *Notice* ¶ 49.

89 *Id.* ¶ 46.

PALs at auction, incumbent operations must still be protected from interference and can be expected to necessarily displace PAL licensees from any given block of spectrum from time to time. Commenters have rightfully raised questions about how this would work in practice, noting that the current SAS dynamic assignment framework helps "enabl[e] a seamless experience for end users," and that channel-specific bidding "would seem to limit the available channels should a PAL licensee need to move to avoid interfering with a protected incumbent."[90]

The current rules offer the best approach for the wide range of business and technical models envisioned for the 3.5 GHz Band. For the band to work for all parties, there must be protection for incumbents and priority for PAL licensees over GAA users, both of which are dynamically managed by the SAS. The current rules already incorporate many of the benefits of channel-specific licensing within a more flexible framework. Under the current rules, the SAS must, to the extent feasible, assign multiple channels held by the same PAL licensee to contiguous channels in the same license area and to the same channels in each geographic area.[91] In addition, under current rules, PAL licensees may already request a particular channel or range from the SAS, subject to protection for incumbents.[92]

VI. THE COMMISSION SHOULD MAINTAIN ITS EXISTING EMISSIONS LIMITS.

The Commission should refrain from changing the emissions limits and preserve the technical rules currently in place. The current out-of-band emissions ("OOBE") limits for the

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90 *See id.* ¶ 48 (citing Google Comments at 28 and Comments of Vivint Wireless Inc., GN Docket No. 12-354, at 8 (July 24, 2017) ("Vivint Wireless Comments")).

91 *See* 47 C.F.R. § 96.25(b)(2)(i).

92 *See* 47 C.F.R. § 96.25(b)(2).

3.5 GHz Band appropriately allow for 10- and 20-megahertz channels but disallow further channel aggregation without corresponding power reduction.[93] The *Notice*, however, proposes to permit users to aggregate even wider bandwidth channels while also eliminating the requirement to make corresponding power reductions when doing so.[94] Other parties have requested even more fundamental alterations to the technical foundation for the band, including increases in transmission power.[95] The Commission should decline further technical changes as the current rules: (a) avoid giving an undue advantage to PAL users at the expense of GAA users; (b) avoid a similar undue advantage to higher power "macro" deployments over small cell deployments; and (c) prevent harmful interference to mission-critical incumbent operations in adjacent bands.

The arguments parties make in favor of relaxing the 3.5 GHz emissions limits are not new, and do not merit reconsideration. The current OOBE limits were designed to be "technology neutral" and "address a wide range of technologies, standards, and radio types," which is why the Commission adopted limits that were "balanced and sufficiently stringent to ensure that spectrum sharing between diverse radio services and license types will work."[96] Noting the insignificance of costs to ensure that 3.5 GHz equipment complies with the current rules,[97] the Commission expressly declined to set higher OOBE limits, explaining that higher

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93 *See* 47 C.F.R. § 96.41; *Notice* ¶ 54.

94 *Notice* ¶ 54.

95 *Id.* ¶ 61.

96 *First Report and Order* ¶¶ 184-185.

97 *See id.* ¶ 187 (noting that the reduced interference potential provided for in the emissions limits does not have a significant impact on equipment cost); *see also* Motorola Comments at 5-6 (arguing that changes to emissions limits are not necessary because current technologies can be utilized to meet the existing limit).

limits would come "at the expense of less spectral efficiency and increased risk of interference to incumbent systems."[98]

The proposal to allow channel aggregation without appropriate power reductions would subject the 3.5 GHz Band to substantially increased amounts of interference for both PAL and GAA users in channels adjacent to the aggregated channels. The adoption of either Qualcomm's proposal or the Commission's "more graduated reduction" would lead directly to a significant noise floor increase with which both PAL and GAA users would have to contend.[99] And, because PAL users have interference protection rights that GAA users lack, this change would disproportionately harm GAA operations. Thus, relaxing the emissions rules would come at the direct expense of reduced GAA activity, contrary to the Commission's objectives.[100]

In addition, wider bandwidth channel aggregation would disproportionately benefit Category B deployments – i.e., higher power or "macro" cells[101] – relative to Category A deployments – i.e., small cells.[102] Low power devices are generally more susceptible to increased interference than high power devices, so Category A devices would suffer more than

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98 *First Report and Order* ¶ 189.

99 *See Notice* ¶ 55 ("A more relaxed mask gives more margin to accommodate bandwidths wider than 10 megahertz, although this could raise the potential for increased interference to users operating on adjacent channels."); Vivint Wireless Comments at 9 (explaining that relaxing the emissions limits will increase interference between adjacent channel operations).

100 *See supra* notes 97-99 and accompanying text; *Notice* ¶ 55 (asking about the advisability of such "tradeoffs").

101 *See First Report and Order* ¶ 209 ("Category B CBSDs will be authorized to operate at higher power than Category A . . . ensuring ongoing compatibility with existing 3650-3700 MHz operations.").

102 *See id.* ¶ 206 ("Category A represents a lower-power use (small cells being the paradigmatic example that we expect will be widely prevalent in the 3.5 GHz Band).").

their Category B counterparts from the increased interference throughout the band that would result from permitting wider bandwidth channel aggregations without corresponding reductions in transmit power.[103] Thus, relaxing the OOBE limits would inappropriately favor Category B deployments over Category A deployments.

Finally, relaxing the emissions limits would result in significant increases in interference to operations in adjacent bands. The proposed changes on OOBE originating from 20-megahertz or wider channels with edges at the 3700 MHz boundary could lead to harmful interference to C-band operations in the 3700-4200 MHz band.[104] Harmful interference to these C-band operations would create new engineering challenges, imposing significant new costs on incumbents in the band. The Commission acknowledged this concern in rejecting T-Mobile's proposal to increase the 3.5 GHz "transition gap" bandwidth from 20 to 40 megahertz,[105] but the *Notice* otherwise fails to acknowledge the potentially serious impact of the proposed OOBE changes on adjacent-band activity.[106]

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103 *Id*.

104 Under Qualcomm's proposal, operations in a 20-megahertz channel situated along the 3700 MHz boundary would be permitted to increase OOBE affecting operations in the 3710-3720 MHz range from -25 dBm/Hz to -13 dBm/Hz. Under the Commission's proposal, the same increase would apply but only to operations in the 3715-3720 MHz range. *See Notice* ¶¶ 54-55.

105 *Notice* ¶ 54.

106 Permitting users to aggregate wider bandwidth channels while eliminating the requirement to make corresponding power reductions when doing so could also unduly limit the potential of the 3.5 GHz Band due to a separate concern related to the C-band. Specifically, the requirement that the SAS enforce existing aggregate protection levels from all CBSDs within 40km of registered, protected Fixed Satellite Service earth stations in the 3700-4200 MHz band would require increased restrictions and result in reduced viability of operations in adjacent CBRS channels, leading to further reductions in channel availability and spectrum efficiency in CBRS bands. *See* 47 C.F.R. § 96.17(b), (c).

The Commission correctly rejected the proposal to increase the power limits for certain CBSDs,[107] as adopting such a fundamental change would oblige the Commission to revisit the innovative sharing framework, which currently strikes a delicate balance that maximizes coexistence among a wide variety of new users and federal incumbents.[108] That balance has been a key factor in attracting the significant amounts of investment the 3.5 GHz Band has already seen.[109] Moreover, reassessing transmission power limits would necessitate a reassessment of the size of the Exclusion Zones, which would almost certainly delay the implementation of SAS and ESC capability, further frustrating the deployment plans of the many stakeholders eager to launch 3.5 GHz services.[110]

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107 *See Order Terminating Petitions* ¶ 61.

108 *See id.* (observing that the Commission's decision to not further increase power levels was "[i]ntegral" to the sharing framework); *Order on Reconsideration* ¶ 80 (acknowledging that some stakeholders would prefer higher power levels, but stating that the current rules "appropriately balance the need for operational flexibility with the need to promote efficient spatial and spectral reuse of the band," and noting that higher power levels "would likely present significant coexistence challenges").

109 *See Order Terminating Petitions* ¶ 61 ("[T]he record shows that there has been significant investment related to SAS and ESC certification in reliance on the current power levels to enable sharing."); *see also Notice* ¶¶ 12, 14; Comments of Federated Wireless, GN Docket No. 12-354, at 3-4 (July 24, 2017); Google Comments at 6-7, 30; Comments of Sony Electronics Inc., GN Docket No. 12-354, at 1 (July 21, 2017); WISPA Comments at 32.

110 *See Order Terminating Petitions* ¶ 61; *Order on Reconsideration* ¶ 80; *see also* Letter from Ross Vincenti, Chief Legal Officer, Federated Wireless, Inc., to Marlene H. Dortch, Secretary, FCC, GN Docket Nos. 17-258 and 15-319, at 1-2 (Dec. 5, 2017) (explaining that Federated Wireless has conducted over 30 technical trials and is undergoing field trials with four different providers; that it is testing equipment compatibility with eight different equipment vendors; and that it has deployed its "Spectrum Controller," whose SAS has over 200 CBSDs connected to it and is processing over 18,000 spectrum grant requests per week); *id*. at 3 (emphasizing the importance of proceeding quickly toward final certification of SAS Administrators and ESC operators to provide investment-enhancing certainty).

VII. CBSD REGISTRATION INFORMATION SHOULD BE SHARED AMONG SAS ADMINISTRATORS BUT NOT DISCLOSED PUBLICLY.

The *Notice* proposes to amend the current rules to prohibit SAS Administrators "from disclosing publicly CBSD registration information that may compromise the security of critical network deployments or be considered competitively sensitive."[111] It further notes that "[n]othing we propose here will affect SAS-to-SAS information sharing requirements."[112] Consistent with these principles, the Commission should protect network-specific CBSD registration information from public disclosure while directing SAS Administrators to share such information among themselves to facilitate frequency coordination, and with other prospective users of the 3.5 GHz Band in an aggregated form to help plan future deployments.[113]

Network-specific geographic locations, power levels, transmission characteristics such as antenna sectors, patterns or orientation, and similar CBSD registration data reveal key features of network design and are appropriately considered confidential business information.[114] As the Commission also observes, public disclosure of such network information also raises cybersecurity and critical infrastructure concerns.[115] The record does not support claims that investment in the 3.5 GHz Band or accountability for productive use turn on the unrestricted

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111 *Notice* ¶ 37.

112 *Id.*

113 *See* 47 C.F.R. § 96.55(a)(2) (requiring SAS Administrators to "make all information necessary to effectively coordinate operations between and among CBSDs available to other SAS Administrators.").

114 *See Notice* ¶ 33 (acknowledging commenters' concerns "about disclosure of confidential business information to the public").

115 *Id.* ¶ 34.

"transparency" of such registration information,[116] and the risks of broad disclosure to competitors or the public outweigh any potential benefits. A requirement to simply "obfuscate the identities of the licensees" raises more questions than it answers, including the specific methods of de-identification required to meet that standard and the risk of competitors or hostile parties re-identifying the remaining information (including by combining it with other sources of data) to study the networks of individual licensees. The better approach is to share disaggregated CBSD registration information only among SAS Administrators.

At the same time, the *Notice* observes that there may be ways to "ensure that prospective users of the band can obtain sufficient information to execute network deployments without disclosing detailed CBSD registration information to the public."[117] As the Commission suggests, potential users of the 3.5 GHz Band could "communicate with an SAS on a confidential basis" to obtain basic spectrum utilization information to help plan GAA deployments or inform their bidding on PAL rights.[118] SAS Administrators will already have access to the raw data necessary for this analysis and would be well-positioned to respond to queries from potential users with an aggregated overview of the spectrum environment for a proposed deployment without disclosing the confidential business information of other network operators. This approach would also address critical infrastructure concerns by protecting CBSD registration information from broader public disclosure to parties who do not have a legitimate need for frequency coordination.

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116 *See id.* ¶ 35.

117 *Id.* ¶ 36.

118 *Id.* ¶ 38.

VIII. THE COMMISSION SHOULD SUPPORT EXTERNAL EFFORTS TO PROMOTE CO-EXISTENCE AND FAIR SHARING IN THE GAA PORTION OF THE BAND.

By taking a light-touch regulatory approach to this band, the Commission has relied on private sector stakeholder groups, including the CBRS Alliance and the WInnForum, to establish the necessary guidelines.[119] These groups have made significant progress on a number of fronts, and their growing membership and tangible progress to-date are proof that the current regulatory framework is encouraging investment and innovation.[120] However, important GAA coexistence issues remain unresolved, and without a clear path to resolution, including: (a) how SAS administrators will partition GAA spectrum among GAA users; (b) how guard bands between GAA users will be calculated; (c) how much interference will be considered acceptable; and (d) how conflicts between CBSDs in a given deployment area will be resolved. A lack of sufficient clarity on these points could significantly weaken the viability of the GAA tier, which is just as important as the others in facilitating the success of the three-tier innovation band.

In order to equitably balance resource allocations and facilitate coexistence among all users of the 3.5 GHz Band, SAS databases should determine the most efficient allocation of spectrum resources in each geographic area when there is demand by multiple GAA users, and all GAA users should have to comply with the SAS's resource allocation decisions. This type of management by the SAS would not only further enhance the incentives for investment in GAA

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119 *See Order on Reconsideration* ¶¶ 197-198.

120 *See Notice* and *Order Terminating Petitions* at 8108 (Concurring Statement of Commissioner Clyburn) ("To-date, fifty-five entities – including chipmakers, mobile carriers, cable companies, equipment manufacturers and more – have joined the . . . CBRS Alliance. Forty-seven companies participating in the Wireless Innovation Forum, have spent tens of thousands of hours developing technical standards to implement CBRS. At least a dozen firms have obtained experimental authorizations to trial equipment and technology in the band.").

by ensuring that tier's viability, but it would also further the Commission's objectives of ensuring that the band maximizes the efficient use of spectrum and is hospitable to a wide variety of users.[121] Accordingly, the Commission should carefully monitor the progress of the CBRS Alliance and the WInnForum on GAA coexistence matters, and encourage resolution of these important issues.

IX. CONCLUSION

Comcast shares the Commission's goals of promoting investment, innovation, and network deployment in the 3.5 GHz Band. As Chairman Pai has said, targeted changes to the existing regulatory framework considered in this proceeding, if adopted, would help to "increase incentives for investment, encourage more efficient spectrum use, and promote robust network deployments."[122] The rule changes supported in these comments would preserve a balanced and robust three-tier framework among all incumbents, PAL holders, and GAA users and make further development of the 3.5 GHz Band attractive and feasible for a wide range of technologies and business models.

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121 *See Notice* ¶ 2.

122 Remarks of Ajit Pai, Chairman, FCC, International Institute of Communications Telecommunications and Media Forum, Washington, DC (Dec. 5, 2017), *available at* http://transition.fcc.gov/Daily_Releases/Daily_Business/2017/db1205/DOC-348071A1.pdf.

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